

Science on the Hill: Fragile life underfoot has big impact on desert

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by Cheryl Kuske

Anyone who spends time in the high-desert landscape of Northern New Mexico has come across biological soil crusts, or biocrusts.

Spread like a brown mold across the sandy soil between bunch grass and bigger plants, this fragile crust of “hidden life”— actually a community of micro organisms — fills a pivotal ecosystem niche. However, its survival is being challenged by threats from climate change and man-made disturbance. The potential consequences could affect us all.

In a biocrust, a thick web of interconnected life sustains Southwestern arid land communities — including trees, shrubs, grasses, cactus and a variety of animals. The hundreds of thousands of species of bacteria and fungi making up the crust interact in ever-shifting ways, responding rapidly to changing environmental conditions. They also provide valuable services to the ecosystem and contribute to the global carbon cycle.

By decomposing organic matter, some of the biocrust microorganisms release carbon dioxide into the atmosphere. Others remove carbon dioxide from the air and fix it into biomass in the soil — this extra nutrition helps support plants through their roots and root-associated fungi. The biocrust also keeps water in the soil, stabilizing it and tempering erosion.

It is a nicely balanced system — except it’s under assault, according to recent research by a multidisciplinary team of biologists, geneticists and computational scientists at Los Alamos National Laboratory and their partners, scientists from the U.S. Geological Survey and the National Park Service.

The research team has found that new threats are tipping scales away from healthy equilibrium.

To unravel the vast, complicated tapestry of biocrusts and figure out why some microbes survive and thrive while some don’t under climate and man-induced threats, the team has combined extensive field studies with state-of-the-art metagenomic research to probe the hidden and highly complex life of biocrust soils.

This article first appeared in the [Santa Fe New Mexican](#).